REMARKS

Applicant respectfully requests reconsideration and allowance of the subject application in light of the foregoing amendments and the accompanying remarks. In the Office Action, the Examiner required a restriction of the claims in the application, objected to the Abstract of the Disclosure for being too long, objected to the claims for informalities, rejected claims 12-18 for indefiniteness and rejected the provisionally elected claims 1-18 for obviousness. In response, Applicant has amended claims 12 and 14, the Abstract of the Disclosure, the specification and Figs. 3, 4, 5 and 9. Applicant will address each of these items in turn.

The drawing changes submitted on August 22, 2001 have yet to be approved. Additionally, Applicant has amended Figs. 3, 4, 5 and 9 herein. Details regarding the drawing changes made herein follow.

Applicant has amended Fig. 3, near the lower right corner, to revise reference numeral "49" to —47—. Applicant wishes to advise the Examiner that in the formal drawings submitted on August 22, 2001, Fig. 4 was amended to delete reference numerals 36 and 72. Additionally, Applicant has amended reference numeral "41" to —45— herein. Applicant has amended Fig. 5 to delete reference numerals 11, 22 and 44 which appeared on the formal drawings submitted on August 22, 2001 but were not on the originally filed drawings. Fig. 5 has also been amended to revise reference numeral "61" to —62—. This amendment to Fig. 5 was necessary since reference numeral 61 was assigned to a control valve in Fig. 1. The corresponding description of Fig. 5 at page 26, line 4, has likewise been amended, replacing "61" with —62—. Reference numeral "41" has been also added to Fig. 5. Applicant would like to point out that reference numeral 135 was added to Fig. 7 and reference numeral 137 was added to Fig. 8 in the formal drawings submitted on August 22, 2001. Although not amended herein, marked up versions of Figs. 7 and 8 are included herein with additions thereto encircled in red. Applicant has amended Fig. 9 to correct the heading to read "#/hr-ft^2" which appeared in the originally filed drawings but appeared incorrectly in the formal drawings submitted on August 22, 2001.

All additions to the drawings are encircled in red ink and provided in triplicate for the Examiner's convenience. The above revisions to the drawings do not add new matter but are evident from other Figures and the specification. Applicant respectfully requests approval and entry of the amended drawings.

Applicant has also made numerous amendments to the specification to correct apparent errors which went unnoticed until this point. Applicant has amended page 20, lines 7-9, of the specification to correctly identify element 44 as "riser outlets" and to delete a typographical error referring to "outside openings 44."

Applicant has amended page 21, line 11, of the specification to add reference numeral "56" after the term "stripping baffle" to provide correspondence between the specification and Fig. 2.

Applicant has amended page 22, line 8, of the specification to change "stripper 14" to —stripper 14'— and also amended line 21, inserting reference letter "A" after the term "angle of inclination" to provide correspondence between the specification and Fig. 3.

Applicant has amended page 23, line 14, of the specification to change "inner radius C" to —inner diameter C—.

Applicant has amended page 25, line 14, of the specification to change "sloped baffle" to —sloped outer baffle 45— to provide correspondence between the specification, Fig. 3 and Fig. 4.

Applicant has amended page 26, line 1, of the specification to include reference numeral "41" and at line 4, to change reference numeral "61" to —62— as previously mentioned.

Applicant has amended page 27, line 4, of the specification to add reference numeral "10" after the term "reactor arrangement" to provide correspondence between the specification and Fig. 6.

Applicant respectfully requests entry of all the amendments to the specification. None of the amendments adds new matter but are apparent from the specification and the drawings.

In the Office Action, the Examiner restricted the application under 35 U.S.C. §121 to one of the two inventions of Group I including claims 1-18, drawn to a process, and Group II including claims 19-27, drawn to an apparatus. The Examiner contends that the stripping of entrained and/or adsorbed hydrocarbons can be accomplished with a materially different apparatus such as a cyclone separator followed by contacting with stripping steam in the absence of baffles. Applicant respectfully submits that an apparatus such as a cyclone separator followed by a stripping vessel would fall within the scope of the independent apparatus claim 19. Therefore, it is not a materially different apparatus. Moreover, contacting catalyst with entrained and/or adsorbed hydrocarbons with stripping steam in the absence of baffles would not fall within the scope of any of the apparatus or process claims in the application. All of the claims include a "baffle" limitation. Hence, although a stripper that has no baffles would be a materially different apparatus, such an apparatus could not be used to practice any of the process claims in the subject application. Accordingly, Applicant respectfully submits that the reasons given for restricting the invention do not support requiring a restriction. Accordingly, Applicant respectfully traverses the restriction requirement and requests that it be withdrawn.

The Examiner objected to the Abstract of the Disclosure for containing more than 150 words. Applicant has amended the Abstract of the Disclosure by deleting the last two sentences. Accordingly, Applicant respectfully submits that the objection to the Abstract of the Disclosure is overcome.

The Examiner objected to claims 12 and 14 because of use of "an particulate material" and because claim 14 uses the term "opening" instead of the plural form. Applicant has amended claim 12 by deleting "an" before "particular material" and has changed the term "opening" in claim 14 to read "openings".

The Examiner also rejected claims 12-18 under 35 U.S.C. §112, second paragraph, for being indefinite. The Examiner pointed out that claim 12 recites the term "the fluidized catalytic cracking" without proper antecedent basis. In reply, Applicant has deleted "the" from before the phrase "fluidized catalytic cracking". Applicant respectfully submits that these amendments overcome the objection for informalities and the rejection for indefiniteness.

The Examiner rejected claims 1-8 and 12-16 under 35 U.S.C. §103(a) as being obvious over U.S. Patent 6,010,618 (the "Lomas patent"). The Examiner points out that the Lomas patent discloses countercurrent stripping in the presence of sloped baffles containing multiple holes but that the Lomas patent is silent regarding the specific configurations of the holes in the baffles. The Examiner contends:

> It would have been obvious to one of ordinary skill in the art at the time the invention was made to select and arrange holes of any size and configuration in the baffles of the Lomas [patent] process that would accomplish desirable stripping, including the specific specifications defined in applicant's claims, because it has been held that changes in size are not a matter of invention. In re Rose, 105 USPQ 237 (CCPA 1955).

Moreover, the Examiner contends, "it has been held that invention in a method must be found in the steps performed and not the apparatus employed. See Ex Parte Hart, 117 USPQ 193 (Bd. PatApp. 1958) [sic]." The Examiner concludes that the "specific baffle opening configuration does not appear to distinguish over the process steps of the applied art." Action at page 5. Applicant respectfully traverses this rejection.

Claims 1 and 10 recite delivering stripping fluid "over the entire sloped surface of each stripping baffle." See specification at page 25, lines 3-6. "Distribution of the holes over the entire sloped surface means the elimination of the previous large areas that were left without fluidizing gas perforations." Id., page 9, lines 6-7. Moreover, Examples 1 and 2 illustrated in Fig. 9 show that the overall level of stripping efficiency increases proportionately with catalyst flux through the stripper. However, with the conventional baffle designs, in which less than the entire surface of the stripping baffle is fluidized with perforations, stripping efficiency decreases proportionately with increases in catalyst flux. The process of the present invention provides an unexpected increase in stripping

efficiency without increasing the addition of stripping steam. No teaching in the Lomas patent suggests fluidizing the entire sloped surface of a baffle by use of a distribution of baffle openings over the entire sloped surface of the baffle. Moreover, the Lomas patent does not suggest that such a process incorporating complete fluidization of the sloped surface of the baffle would provide increased catalyst stripping efficiency with increased catalyst flux at a given steam stripping rate. In other words, without increasing the utility cost of steam, Applicant's claimed invention can strip more catalyst than prior art stripping processes at greater efficiency, a remarkable and unexpected result.

The Examiner contends that the claimed invention merely involves a change in size which is not a matter of invention. However, Applicant respectfully submits that arranging openings over the entire sloped surface of the stripping baffle is not a change in size. Indeed, it is a structure dictated by a stripping process that was designed after careful research to fluidize the entire surface of the stripping baffles and eliminate unfluidized areas of catalyst which Applicant found diminishes stripping efficiency.

The Examiner also contends that the invention is only found in the apparatus employed which cannot support a method claim, and therefore, does not distinguish over the Lomas patent. However, independent claims 1 and 12 recite, "discharging a stripping fluid upwardly through a plurality of openings distributed over the entire sloped surface of each stripping baffle." The quoted claim recitation is clearly a process step limitation which further specifies that discharging stripping fluid over the entire sloped surface is performed by means of a plurality of openings distributed over the sloped surface of the baffle to provide at least one opening for each square foot of sloped surface. Independent claims 1 and 12 clearly recite process limitations that merely and additionally specify the structure for carrying them out. Moreover, the applicability and sustainability of the decision of the Board of Patent Appeals from 1958 in Ex Parte Hart is clearly questionable especially since 35 U.S.C. §101 defines "processes" as one of the types of patentable inventions and 35 U.S.C. §100(b) defines a process to include a new use of a known machine. Hence, if a new use of a known machine is patentable, it would be illogical that a new use (fluidizing the entire surface of a stripping baffle) of a heretofore unknown machine (stripping baffle with openings distributed over the entire sloped surface) would not also be patentable. Accordingly, Applicant respectfully submits that independent claims 1 and 12 and, at least for the same reasons, dependent claims 2-11 and 13-18 are patentable over the cited references.

The Examiner also rejected claim 1 of the subject application over claim 2 of copending application No. 09/877,981 and claims 1-8 and 11-16 of the subject application over claims 1-7 and 17-20 of copending application No. 09/990,244 for obvious-type double patenting. Applicant respectfully traverses these obviousness-type double patenting rejections because both of the applications cited were filed after the subject application. Application No. 09/877,981 was filed June 8, 2001 and application No. 09/990,244 was filed November 21, 2001. However, the subject application was filed December 21, 2000, claiming the benefit of provisional application No. 60/173,606 filed December 29, 1999. Accordingly, Applicant respectfully submits that the two copending

applications are not competent references to subject the claimed application to a double patenting rejection.

For the foregoing reasons, Applicant respectfully requests reconsideration and allowance of claims 1-27 pending in the subject application. Should the Examiner have any questions regarding this matter, please feel free to call the undersigned.

Respectfully submitted,

James C. Paschall

James C. Paschall
Attorney for Applicant
Reg. No. 36,887
(847) 391-2355 (phone)
(847) 391-2387 (fax)

James W. Hellwege
Registration No. 28,808
Washington Counsel (703) 205-8021

JCP/gm

Marked Up Version of Amended Specification:

[page 20, lines 7-14] Riser 22 discharges the catalyst and hydrocarbon mixture through [openings] riser outlets 44 to effect an initial disengagement of catalyst and hydrocarbon vapors. [Outside openings 44, a] A majority of the hydrocarbon vapors continue to move upwardly into the inlet of cyclone separator 46 which effects a near complete removal of catalyst from hydrocarbon vapors. Separated hydrocarbon vapors exit reactor 12 through an overhead conduit 48 while a discharge leg 50 returns separated catalyst to a lower portion of the reactor vessel. Catalyst from riser outlets 44 and discharge leg 50 collects in a lower portion of the reactor and supplies catalyst to stripping vessel 14.

[page 21, lines 11-22] FIG. 2 shows a stripping baffle 56 having the greatest extent of hole distribution known to have been previously practiced in a sloped baffle-type stripper. This hole pattern was used in a stripper having a diameter of about 4.5 feet (1.4 meters) and a centralized distribution 56' of approximately 160 holes over ten rows arranged in a uniform triangular pitch. The relatively narrow band over which the large number of holes was centralized is only about equal in width to the nominal radius of the stripping vessel. Thus, even when the largest number of holes were provided, large areas of unperforated sections still exist over the sloped surface. For example, the lower portion of the sloped surface is unperforated in approximately a 10 inch (25 cm) length from the first row of holes towards the bottom edge of the baffle. This still leaves an area of over 3 ft^2 (0.279 m^2) at the bottom of the baffle without any perforations and an even greater area without perforations at the top of the baffle.

[paragraph bridging pages 22 and 23] FIG. 3 shows a series of stripper baffles arranged in accordance with this invention for replacement of the baffles shown in FIGS. 1 and 2. As opposed to the baffles 56, shown in FIG. 1, which extend from opposite sides of the stripping vessel 14, the internal baffle arrangement of a stripper 14' uses the more common annular arrangement of sloped baffles. While the annular-type sloped baffles are preferred, side-to-side baffles as shown in FIGS. 1 and 2 may also be employed in this invention. The sloped baffles have a generally annular projection across the transverse

cross-section of stripper [14] 14'. Inner baffles 41 extend outwardly from a central support conduit 43 that finds support from the top of stripper vessel 14'. Outer baffles 45 extend inwardly from the outer wall of stripping vessel 14'. The baffles extend down the vertical length of stripper 14' for a substantial portion of its vertical length. Increased stripper performance is usually obtained with an increased number of baffles. The available length of the stripper for layout configurations or other equipment constraints may limit the number of baffles that may be incorporated into the stripper. The annular baffle configuration is generally preferred since it will maximize the number of baffles which may be located within the stripping vessel. Additional baffles represent additional stages of stripping and most strippers will usually have a minimum of seven baffles overall. Spacing between the baffles must provide sufficient flow area for cascading movement of the catalyst around the inner and outer baffles. Providing a slope to the projecting baffle surface ensures movement of the catalyst across the baffle surface. Generally, the baffles will have an angle of inclination A to the horizontal of between 30° and 45°. Shallower angles of the baffles have the advantage of further maximizing the number of baffles that may be located in a given stripper length and providing less differential in the pressure head between the holes closer to the edge and the holes closer to the wall to which the baffle is attached. Moreover, a 30° angle gives more uniform jet velocity than a 45° angle because holes farther from the edge have a lower elevation and a greater pressure head. A baffle angle of 0° may be better than a baffle angle of 30°. However, as the baffle angle becomes more shallow catalyst has a greater tendency to accumulate on the baffle and the aeration of catalyst on the baffle becomes more critical. Hence, baffles with shallower angles must be provided with greater hole density to maintain fluidization of the catalyst for a given catalyst flux. Setting the angle of inclination of the baffles at 30° provides a good compromise between the competing considerations. However, the advantages of this invention may still be obtained through the use of horizontal baffles which gives the most uniform jet velocity but also requires the greatest hole density.

[paragraph bridging pages 23 and 24] The outer diameter B of the inner baffles 41 and the inner [radius] diameter C of the outer baffles 45 are sized to facilitate construction of the stripper internals and to balance catalyst flow areas. Accordingly, dimensions B and C are ordinarily set so that the transverse projection of the inner and outer baffles cover approximately an equal area. Maintaining outer diameter B slightly smaller than inner diameter C permits insertion of conduit 43 with inner baffles 41 assembled thereon so that there is adequate clearance for the installation of both the inner and outer baffles. The difference in diameters B and C is kept relatively small and it is preferable that each baffle covers at least one-third of the total transverse annular flow area of stripper 14'. Preferably, the combined transverse projection of the inner and outer baffles will have a projection that substantially covers the annular cross-section of the stripper.

[page 25, lines 3-22] An important feature of this invention is the distribution of the baffle openings over the entire sloped area of the baffles. The spacing of the perforations over the sloped area may be arranged in any manner that eliminates wide bands or areas that do not contain holes for delivery of the fluidization medium. The hole distribution most beneficial to this invention can be described by a limitation on the maximum circular area that must contain at least one opening. Generally, any circular area of at least 1 ft^2 (0.09 m^2) must surround at least a portion of one or more openings in that area. The circular area that can be circumscribed without enclosing a hole will usually not exceed 0.5 ft^2 (0.05 m^2). Following this type of criteria for the minimum geometry of an area that must contain a perforation will eliminate any large unperforated areas from the baffles. The spacing shown in FIG. 4 uses two rings of holes with the rings spaced approximately equally over the annular width of the sloped outer baffle 45. Inner ring 53 has approximately 72 holes equally spaced holes. Outer ring 55 has approximately 36 equally spaced holes. Each ring of holes 53 and 55 is approximately 3 inches (7.6 cm) from the nearest edge of the baffle and the adjacent row of holes. In an annular baffle arrangement, the largest spacing between the openings on the baffles is likely to occur in the outermost row of holes due to the increasing diameter of the baffle and especially in

view of the increased pressure drop at the outer ring of openings which would require reduction in the total open area provided by the openings to obtain a uniform volumetric distribution of gas over the entire sloped surface.

[page 26, lines 1-13] With respect to the inner baffles 41, the decreasing diameter of the baffle surface with increasing elevation promotes a more uniform distribution of the openings over the entire baffle surface. FIG. 5 shows such an arrangement where four rings of openings 57, 59, [61] 62, and 63 contain 44, 44, 22, and 11 holes, respectively. Accordingly, the spacing between the openings in the first two rows are approximately the same and the spacing between the different rings of openings varies from about 3 inches (7.6 cm) at the bottom to approximately 8.25 inches (21 cm) at the top. The objective in spacing the openings is not so much to establish uniform distances but to have openings on lower rows that lie intermediate the openings in upper rows and thereby eliminate extended flow paths across the baffle that could permit catalyst to bypass the stripping medium. When the number of holes in a particular ring of openings becomes excessive, different diameters may be used relative to the upper holes to provide additional open area without increasing the number of holes.

[paragraph bridging pages 27 and 28] The reactor arrangement 10 in FIG. 6 operates in essentially the same manner as the reactor and riser shown in FIG. 1. A regenerator standpipe 116 transfers catalyst from a regenerator (not shown) at a rate regulated by a slide valve 111. A fluidization medium from nozzle 117 transports catalyst upwardly through a lower riser portion 114 at a relatively high density until a plurality of feed injection nozzles 115 (only one is shown) inject feed across the flowing stream of catalyst particles. The resulting mixture continues upward through an upper riser 112 until a pair of disengaging arms 121 tangentially discharge the mixture of gas and catalyst from a top 119 of the riser into a disengaging chamber 123 that effects separation of gases from the catalyst. A transport conduit 122 carries the hydrocarbon vapors and entrained catalyst to one or more cyclones 124 that separates spent catalyst from the hydrocarbon vapor stream. A collection chamber 125 gathers the separated hydrocarbon vapor streams from the cyclones for passage to an outlet nozzle 128 and into a fractionation zone (not

shown). Diplegs 130 discharge catalyst from cyclones 124 into a lower portion of a collection space 131 that eventually passes the catalyst and adsorbed or entrained hydrocarbons into stripper zone 132 across ports (not shown) defined by the bottom of disengaging chamber 123. Catalyst separated in disengaging chamber 123 passes directly into stripper zone 132. The stripping gas enters a lower portion of the stripping zone 132 through an inlet 133. Inlet 133 may supply the stripping gas to one or more distributors (not shown) that distribute the gas around the circumference of the baffle. The spent catalyst leaves the stripping zone through a reactor conduit 136 and passes into the regeneration zone.

Marked Up Version of Amended Claims:

12. (Amended) A process for the stripping of entrained and/or adsorbed hydrocarbons from particulate material, wherein the entrained or adsorbed hydrocarbons are from [the] fluidized catalytic cracking (FCC) of an FCC feed with [an] particulate material comprising an FCC catalyst, said process comprising:

contacting an FCC feed with FCC catalyst to provide a mixture of FCC catalyst and FCC feed and to convert the FCC feed while depositing coke on the FCC catalyst;

disengaging converted FCC feed from the FCC catalyst to produce a stream of disengaged catalyst particles containing entrained or adsorbed hydrocarbons;

passing the disengaged catalyst particle stream into a stripping zone and passing the stream of catalyst particles downwardly through a plurality of vertically sloped stripping baffles in the stripping zone;

discharging a stripping fluid upwardly through a plurality of openings distributed over the entire sloped surface of each stripping baffle to provide at least one opening for each square foot (0.09 square meter) of the sloped surface of each baffle and stripping hydrocarbons from the FCC catalyst;

recovering stripping fluid and stripped hydrocarbons that pass upwardly from the stripping baffles;

recovering stripped FCC catalyst that passes downwardly from the stripping baffles;

passing stripped FCC catalyst to a regeneration zone to remove coke from the FCC catalyst; and

returning FCC catalyst from the regeneration zone for contact with the FCC feed.

14. (Amended) The process of claim 12 wherein a lower portion of the sloped surface has a greater concentration of openings than an upper portion of the sloped surface.

Marked-Up Version of Amended Abstract:

A baffle-style stripper for an FCC process having a complete or nearly complete coverage of stripping openings over the sloped surface of the baffle will provide improved stripping efficiency and catalyst flux through the stripper. The complete distribution of relatively small openings over the entire surface of a sloped baffle has been found to interrupt relatively dense streamers of catalyst that were previously not known to exist and which short-circuited the contact of the stripping fluid with the catalyst. Spreading out the stripping gas across the sloped area of the baffle to a much greater extent than has been practiced in the past has now been found to promote active contacting of the catalyst with the stripping fluid over the entire volume of the stripper between the baffles. [As an added benefit, more complete coverage by the stripper openings also prevents choking of stripper flow by the restriction of stripping gas flow to narrow open areas between the sloped baffles. By this discovery, previous limits for typical baffle-type stripper throughput may be increased by as much as 50%.]